EMANO-THERAPY

(MILD RADIUM THERAPY)

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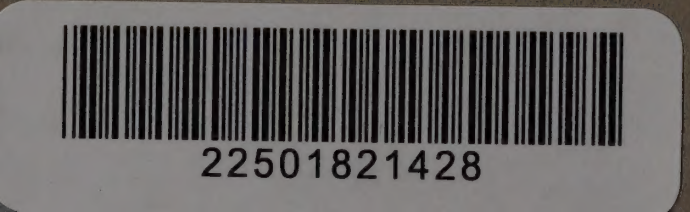

INTRODUCTION

In view of the recent developments in nuclear energy, which has re-awakened widespread interest in radio-activity throughout the world, medical men are now expected to speak and act with authority on the subject, especially in so far as it applies to medicine.

Radium therapy consists of two distinct and widely separate branches. One branch is known as deep radium treatment, and the other as mild radium therapy. It is most essential to understand the difference between them. Deep radium treatment consists of the use of powerful doses of radium in a highly concentrated form, applied to a localised area, as used in the treatment of malignant disease. This use of radium is really a branch of surgery, and as the technique is well known, it is not proposed to discuss it here. It has no relation whatsoever to the second branch, mild radium therapy, or Emano-therapy which is a better term. To avoid confusion, the term Emano-therapy will be used throughout, as the old names for the treatment, Radon and mild radium treatment, are liable to be mistaken for the deep treatment.

As there is but little English literature on the subject of emano-therapy, and some of it not quite technically accurate, it is felt that the time has now arrived when this deficit should be made good. This has been written in the hope that it will supply accurate and reliable data on this subject to those medical men who wish to use this simple and successful therapy.

Owing to their high authority, the writings of Madame Curie, Prof. Rutherford and Prof. Soddy have been largely used in the technical matter, as also those of Dr. Wickham, Prof. Halliburton, Dr. Finzi, Dr. Noorden, Dr. Hollander, Dr. T. Luke, Dr. A. Luff, Dr. Bannatyne, Dr. N. Mutch, Dr. V. Borland, Prof. Dawson Turner and several other medical authorities. In addition we record our own observations founded upon thirty years' practice under strict medical supervision, of emano-therapy, and those of our medical associates, in all the chief centres of the therapy throughout the world.

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NATURE OF RADIUM

A detailed description of the physics of radium can be obtained from any text-book on the subject, so it will be unnecessary for the purpose of this work to give more than a very brief account of the nature of radium.

Radium belongs to the group of alkali earth metals which comprises barium, strontium, calcium and magnesium. As a disintegration product of uranium, radium is never found in the natural state apart from its parent element. They always occur together geologically in the definite ratio of one part of radium to each 3,400,000 parts of uranium. The atomic weight of radium is 226.

In the metallic state it is a pure white metal, but it is never used in this form because it changes quickly when exposed to air and reacts with moisture, decomposing into hydrogen and oxygen with the production of radium hydroxide. Hence it is always prepared and used as a salt. These compounds are the bromide, chloride, nitrate, sulphate and carbonate. The first three are soluble, the last two insoluble. When, therefore, we speak of radium we mean one of the salts of radium, and like radium, all its preparations are radio-active.

EXTRACTION AND PURIFICATION

The extraction of radium element from the ore, and its subsequent purification is a lengthy and costly process. Fractional crystallisation is employed, at careful temperature control. As soon as the radium crystals commence to form they are removed from the solution and collected. These are re-crystallised and the process is repeated many times with the resulting enrichment in the purity of the crop. Very accurate control of every stage in the process is essential, especially in the final series of the fractional crystallisation. No other chemical process can compare with this extremely fine concentration which results in separating the radium element from several million times its own weight of ore.

RADIO-ACTIVITY

There are a number of radio-active elements of which the most important are uranium, radium, polonium, actinium, thorium and mesothorium. Of these, radium is by far the most valuable and important because it disintegrates at a convenient rate, permitting the use of its radiations and gaseous emanation

(radon) over a long period of time. All other radio-active substances are disintegrating so much faster or slower and are therefore correspondingly less valuable.

Radio-activity may be defined as the spontaneous emission from the nucleus of a complex atom of helium (Alpha particles) or single negative electrons (Beta particles) at a high speed with the production of new forms of chemical matter.

This is the outward sign of spontaneous disintegration of the radio-active substance or a transmutation of the elements atom by atom, into other substances. Until the discovery of radio-activity, such atomic changes had not been observed. It is established that this process of disintegration is dynamical and always going on at a perfectly definite rate of uniformity. In the case of radium one per cent of its mass disintegrates each twenty-five years. Its half life period is about 1700 years. Lead of atomic weight 206 is the final end product, there being at least seven intermediate bodies between radium and lead, as shown in the following table:

Substance	*Half Life Period*	*Radiation*
Uranium	5 billion years	Alpha
Ionium	—	Alpha, beta, gamma
Radium	1690 years	Alpha, beta, gamma
Emanation	3.85 days	Alpha
Radium A.	3 minutes	Alpha
Radium B	26.8 minutes	Beta
Radium C	19.5 minutes	Alpha, beta, gamma
Radium D	16.5 years	Beta, ? ,
Radium E	5 days	Beta, gamma
Radium F	136 days	Alpha
Radium G (lead)	Nil	Nil

Each of the above substances is formed from the one preceeding it after the manner of a cascade with an outburst of energy, evidenced by the emission of rays. Ionium has not yet been isolated. From radium D, beta rays are given off and other rays which have not yet been isolated.

RADIUM RAYS

Three rays are given off known as the Alpha, Beta and Gamma. The alpha rays are electrons, carrying two positive charges of electricity. They have poor penetrating power, are stopped by three inches of air or a sheet of paper. The beta rays are simple negative electrons, having more penetrating power than the alpha and travel at a much higher speed.

The gamma rays are high frequency ether vibrations of very short wave length, travel at a very high speed and have enormous penetrating power. The gamma rays are capable of penetrating eight inches of lead. These are the healing rays used in deep radium treatment.

MEASUREMENT

The unit of measurement is the milligramme. One gramme equals one thousand milligrammes, also one gramme equals 15.432 grains, and 28.35 grammes equals one ounce avoirdupois.

The quantitive value of a radium preparation is gauged by its degree of activity. This radio-activity is measured by the electroscope with standards of known activity under specially controlled conditions.

PURITY

In addition to the measurement just referred to, all radium salts should carry a guarantee from the producer as to the purity of the preparation and to its freedom from mesothorium or other radio-active adulteration and should read:—

> This is to certify that the gamma radiation from this preparation is entirely due to radium and its derivatives and not to mesothorium or any of its disintegration products.

This guarantee is of the utmost value to the purchaser because it is impossible to determine the presence of mesothorium in combination with radium, except after a series of tests which necessitates the removal of the radium from its container and consequent expense and loss of part of the element in the process.

MESOTHORIUM

If the radium is contaminated with mesothorium the preparation is affected in value. Thorium and

its derivate, mesothorium, although radio-active have a much shorter life than radium, and are therefore of much less value than radium. The half-life period of mesothorium is only 5.5 years whilst that of radium is about 1700 years. Inasmuch as mesothorium and radium are isotopic elements and inseparable when they occur together in the natural state or when afterwards associated, it is of first importance that the preparation of pure radium should be made from ores free from thorium. Thorium gives off emanation, but as its life is only of three minutes duration, it is valueless in emano-therapy.

EMANATION

As the emanation from radium is the entire feature in emano-therapy, it will be necessary to discuss it in some detail.

As previously stated, the activity of radium is due to the disintegration of that element. Just as radium is a disintegration product of uranium, so radium in its process of decay forms a series of subsidiary substances, the first of which is known as the emanation.

The emanation is a gas possessing the property of radio-activity, is odourless, tasteless, colourless and is soluble in water, oils and fats.

It is constantly being produced within the radium, but is only freely liberated when the salts are dissolved or heated. By heating the radium salts or drawing a vacuum the emanation can be removed. The radium thus freed from its emanation is very much reduced in activity, but as fresh emanation is formed it again gathers strength until its activity is completely restored.

The emanation is intensively radio-active, mass for mass more so than the radium itself. It is 100,000 times more radio-active than the radium which has given it off for it is the essence through which radium acts.

Its radio-activity does not last long, being reduced to half value in 3.85 days, and in about a month has completely disintegrated. Whilst it is decaying, more is being produced until a point is reached when the decay equals exactly that being formed. The radio-active point then remains constant and the radium is then said to be in radio-active equilibrium.

The emanation is the true gas, very dense, having atomic weight of 222, can be condensed to a liquid at – 150 C. It would appear to be chemically inert as it does not enter into chemical combination with other substances. Any body exposed to the emanation becomes temporarily radio-active and this induced activity is produced by the active deposits of the emanation.

EMANO-THERAPY

From the physical and technical aspects we have seen that radium emanation is a fixed and definite entity, and takes origin without the agency of external factors. It has been used as a therapeutic agent for many thousands of years, but only during the last 40-50 years has it been under proper scientific control. The history of Spa Treatment goes back to ancient times, at least as far as the Roman period when their baths were credited with mystic cures. Why some springs should possess a curative effect in certain diseases, giving rapid results that are little short of marvellous, and other springs, even in close proximity, having no beneficial action, has always been a strange feature of these waters.

In the days when Europe was young, the small village of St. Joachimstal in Bohemia achieved fame on account of the healing powers of the waters from a spring which bubbled up from the rocks. The air of the district was also known to possess the same strange influence. Later, other springs in various parts of Europe were found to possess this power of healing the sick. People suffering from all sorts of complaints travelled to these spas to take the waters and breathe the air. Chronicles relate how pilgrims came from foreign lands and found relief from their pains, and gained fresh vigour and vitality. Another interesting feature recorded by the historians is that the earth close to these springs also possessed this same healing force and it was customary to sew some of the earth into little bags and apply these to painful joints. Many were the cures which were recorded, and these bags were the forerunners of the modern radium pad.

It was from the ores of the mines of St. Joachimstal that Madame Curie succeeded in separating radium. Investigations into the characteristics of radium revealed the presence and nature of emanation. Later it was found that the waters of these spas and the air in the vicinity contained radium emanation.

The curative value of natural spas is in great part due to the small quantity of emanation contained in these waters. The earth of the districts in which these spas are situated is rich in radium ores and the waters of the spring flowing through the ores dissolve and carry off the emanation. The water is thus activated and is used for bathing and drinking purposes. When the emanation is drunk the activity is carried to all parts of the body and every cell and gland is favourably influenced by its tonic and selective action.

It is now definitely established that the elusive healing element contained in these waters is emanation. For this definite reason chemists failed so utterly to reproduce waters having the same curative action as those of the world famous spas. Radium emanation cannot be detected by ordinary means of analysis such as employed in analysing ordinary water. It is observed that if the waters of the spas are bottled for several days, they do not demonstrate the same curative effect as when drunk fresh from the spring. This is due to the disintegration of the emanation, its half life period being 3.85 days, it can confer to the water only a temporary radio-activity.

As a therapeutic agent it has been employed scientifically for 40-50 years and yet it is but little known in this country, although employed in medicine abroad in many ways, such as in the form of drinking water, baths, inhalations, compresses, sprays, sub-cutaneous injections, ointments and liniments. Once looked upon by the medical profession with distrust, this form of treatment is now definitely established and entered into its proper and very prominent place in physical therapy. In Paris alone, it is being used in twenty hospitals and also extensively in many other countries besides France, notably Germany where it is used in more than 2,000 hospitals and clinics. In Hamburg there is a special institute devoted entirely to emano-therapy. It is also employed in Czechoslovakia, Italy, Spain, Portugal and in the U.S.A. It is to our own discredit therefore that people in this country still confuse emanation with radium and impute to the beneficial properties of emano-therapy, the dangerous properties of radium itself.

Dr. J. Gutman, Director of the Brooklyn Diagnostic Institute says "A diligent search of medical literature for casualties definitely connected with the drinking of radio-active water charged with emanation only shows the absence of such casualties".

Humphries and Williams say "The emanation are gases in a state of continual transformation, they are but short lived, so that the production of a cumulative effect is impossible. Overdose is likewise impossible since there is a co-efficient of solubility of emanation in the blood stream which cannot be exceeded. The

undissolved surplus, not being used, is immediately eliminated by the usual channels, The treatment is foolproof and is likely to be used more extensively in the future. It cannot possibly be dangerous, and is entirely free from any sort of risk".

Leonard Williams of the French Hospital in London says, "Practical experience shows that the result of spa treatment are so immeasurably superior to any other, that it is not too much to say that by neglecting to advise such treament the physician is not doing his best for his patient. The advantages are not confined to any stage of the disease, though it is naturally in the earliest that the best results are to be expected".

A frequent question asked is why emano-therapy which is known and practised so extensively, with such excellent results on the Continent of Europe is almost unknown in this country. The chief reason for this is, in this country we have no natural spas of high radio-activity, such as there in Europe. The Continental spas have a long history extending back many hundreds of years. It is only natural that medical interest would have been taken in a locally known curative agent, although the reason for the cures was unknown for centuries.

The following table of natural radio-active springs gives an indication of the activity of the waters, measured in millimicrocuries. The millimicrocurie is the amount of emanation in equilibrium with one-millionth part of one milligramme of radium element.

St. Jochimstal (Ch. Slov.)	820	Bagneres-de-Luchon	41.5
Brambach (Germany)	785	Estreys (het-Loire)	34
Clinical instrument	300	Colorado	30.5
Ischia (Italy)	149	Karisbad	28.5
Yunokubo (Japan)	90	La Bourboule	20.5
Sail-les-Bains (France)	67	Vernet (France)	15.5
Agnez Lerez (Spain)	65	Royat St. Victor	15.3
Gastein Grabenbacker (Ger.)	62	Plombieres	14.1
Gastein Elizabeth (Ger.)	53	Bath, King's Well	1.73
Baden Baden	50	Ave. British tap water	1

One great disadvantage from the clinical aspect in natural spa water, is the activity of these waters do not remain constant, fluctuating as they do from hour to hour, it is the exactitude of dosage which makes for the superiority of the clinically prepared emanation in emano-therapy over nature's best effort. Not that spa treatment is to be decried for one moment, but in these days, when fewer and fewer patients find it possible to go to spas, it is well that it should be more generally known that there is a means whereby the essential constituents of such treatment can be obtained in one's own home.

The restoration and maintenance of health are very much a question of daily habits, and it is often essential to a certain class of invalid for their well-being, that the use of emanated water shall form an integral part of their daily regimen.

Emano-therapy as described here is consistent with spa treatment, but having the advantage over natural spas that accurate dosage is maintained, and the waters after being activated by the emanator is to all appearances unaltered as to taste or smell. This in itself has distinct advantages. As the action of the emanator is physical, it is a drugless treatment. The water can be safely taken by very young children, the aged or feeble and has no unpleasant reaction. It is soothing and gives a sense of greater mental brightness and a natural feeling of well-being.

There are several recognised methods of applying emano-therapy, by its adaption in specially-prepared instruments, pads, ointments, inhalors, liniments, etc. The instrument known as an emanator is used to activate water. There are two types of emanator. One is designed to prepare water for baths and drinking purposes, the other to prepare drinking water only, They are designed to be portable, so patients can carry them when travelling. The measurements are Bath size, 5in. x 7/8th in. and the Drinkwater size, 4in. x 1/2in. They are ebonite tubes, capped at both ends, pierced by small holes, and containing insoluble radium salts, with element content standardised to give required activity per litre of water. Standardisation is on 12 hours immersion on all types of emanator.

The following extract is from the British Journal of Physical Medicine, April 1932:

"The apparatus reduces the production of radio-active water to its simplest terms . . . The Radigam generator relies upon diffusion only, thereby sacrificing a certain amount of activity, but obtaining a great simplification in use. The active material contained is held . . . this is placed in water, which then percolates through the holes, and the radon is dissolved. A certain percentage diffuses out and the water in which the tube is standing becomes radio-active. The salt of radium employed is insoluble, so there is no less of the active material in use".

The emanators are so simple to use that the patient has no difficulty in preparing activated water. The bath size emanator is placed in 1½ gallons of water for 12 hours, sufficient to activate one bath per day if required. The drinkwater type activates 1½ pints in 12 hours or 3 pints per day.

ACTION OF EMANATION

The emanation acts by increasing the rapidity of tissue oxidisation and by increasing the activity of all body ferments. Therefore metabollic change is more rapid and elimination of waste products more complete. It is known to have a powerful bactericidal action. (Brit. Med. Journal, 1910).

The physiological action of emanation is a stimulation of cell activity, arousing all secretory and excretory organs and encouraging more rapid excretion of toxic material. The effect on the nervous system is sedative and analgesic. Patients undergoing emanation treatment feel fitter and look better, there is a general increase of functional efficiency, ability to work and to enjoy doing it.

INDICATION FOR EMANO-THERAPY

Emano-therapy is consistent with spa treatment but having the advantage that each sequence of the course of treatment is under proper scientific control and that carefully measured doses are administered. Apparatus is now available whereby emano-therapy can be given in hospitals, or in the home of the patient or physician, in which the output of emanation can be automatically and scientifically controlled.

It is important to remember that in emano-therapy the patient is never brought into actual contact with radium.

The effect of emanation in drinking water is very definite and favourable. The experience of those who have and are using the clinically prepared emanation coincide with that of the physicians practising at the well known spas. Experience teaches and emphasises that a slowing down of tissue change, the creeping disabilities of middle age, are more certainly rectified by emano-therapy than by any other means. The use of activated water and its undoubted success in a large number of diverse diseases show plainly that the factor at work could not be in any degree specific to each disease, it is clearly a natural and normalising factor. One which is more or less applicable to all morbid states, and this could only be presented by an

energy which promotes and stimulates the resisting powers of the body to disease. By promoting tissue change, and building new healthy tissue, the general fitness of the individual is increased.

The action of the emanation is indirect, acting not so much on the affected organ as on the whole of the body. This is brought about by a direct transference of the energy from the emanation to the tissue. One result of which is increased oxidation of the cells thereby favouring osmotic exchanges and elimination of waste products of the body.

Indications for the use of emano-therapy are mainly as follows:—

Internal emanation:	Rheumatism — Arthritis — Gout. High Blood Pressure Nervous diseases. Premature senility. Convalescence.
Inhalation emanation:	Diseases of the respiratory organs.
Radiation emanation:	Skin diseases. Inflammatory diseases. Relief of pain.

LOCAL TREATMENTS

SENILITY

On the continent special stress is laid upon the rejuvenating action of emano-therapy, and those in this country who have experienced the treatment are of the opinion that this claim is well-founded. The rejuvenation and revitalising of the skin was reported as long ago as 1911 in the British Medical Journal by Dr. Armstrong, wherein he states that the results of treating 400 cases with emanation in drinking water showed "great improvement in appearance and clearness of the skin, and also in the brightness of the eye".

It is a natural remedy for constipation. Red Cells are increased, and in some people a varying degree of leucocytosis is produced. It acts partly as a check and partly as a stimulant to the respective secretions and digestive ferments of the body and is therefore a natural normaliser.

Dr. Bernard Hollander says in his book "Old Age Deferred" "not only are diseases caused by defective metabolism successfully treated but it retards the process leading to old age, and that the proper treatment having been given, the signs of premature old age disappear, the movements of the patient get firm and confident, there is a great elasticity and freedom from fatigue and it seems to stir up the fires of life throughout the system".

HIGH BLOOD PRESSURE

When patients suffering from high blood pressure with gout were being treated by emano-therapy it was observed that the pressure sensibly diminished during the treatment. Dr. Mutch of Guy's Hospital, London, has given special attention to this subject, and published in the Lancet some very interesting data. The method which he used — the injection of minute doses of radium chloride — is not used in emano-therapy since equally good results can be obtained with emanation.

In this very useful paper by Mutch, he has recorded the results of a series of cases of high blood pressure, and shows that there was a delay of one or two days in hypepiesis before it became appreciable as to be outside the range of expected variations. The fall continued for many days, and the lowest recorded figures were not reached until the end of a week or more of treatment. A fall of 50mm in systolic pressure was not uncommon, but in view of this high figure, he stated that it never became sub-normal. Unlike the effect obtained with simple vaso-dilators, the state of lowered pressure persisted throughout the twenty-four hours, even on one dose daily. The fall did not occasion any malaise, nor did it as a rule, bring fresh cardio-vascular symptoms into prominence. On the contrary, the patients experienced feelings of greater well-being, and showed an all round improvement in general condition. When the course of treatment was suspended the pressure continued at a lowest value for several weeks, but often, after a time it began to rise again slowly. In certain cases, the full advantage persisted indefinitely. In other cases it was possible to sustain the low figure by giving an exceedingly small amount of emanation every week. When partial relapse occurred a further response to emano-therapy was easily secured. There was a small proportion of patients in which the blood pressure did not respond at all. In these cases treated by Mutch, the reduction in systolic pressure which he obtained varied from 12-54mm of mercury, the average fall being 35mm. In each cases a further course was given and when the pressure had once fallen a small keeping dose and a suitable interval were determined, which were sufficient to prevent any further relapse. He attributed these results to four factors (1) diuresis, (2) improved condition of the vessel walls, (3) improvement in general health, (4) vaso-dilation.

RHEUMATISM

Rheumatism is characterised by inflammation of the muscular, fibrous or sirous structures of the body and may give rise to affections of many organs. Acute rheumatism (Rheumatic fever) may occur at any period of life, but it is most common before the age of thirty. The joints are swollen and excessively tender and the pain is greatly increased by the slightest movement. The most frequent complication of acute reheumatism is an affection of the heart. This is a serious complication and here it should be mentioned that there is no such things as "growing pains" in children. These pains are serious and due to acute rheumatism. They should receive the proper treatment for otherwise they will only manifest at a later period when treatment will be more serious. Another incorrect diagnosis may be "influenza" where the condition is really a myalgia or muscular rheumatism distributed over a wide area. The person who has apparently had "influenza" ten times in the past six months, has probably never had influenza at all.

Chronic rheumatism may remain as a result of rheumatic fever or it may attack those who have been previously healthy. There is no fever, but the parts affected are stiff, very painful and tender; the slightest movement is sufficient to increase the agony. When it occurs in the joints, adhesions are likely to take place so that the movement of the joints become restrained. A feeling of grating on movement is felt when the hand is held over the joint.

White fibrous tissue is found practically in all parts of the body so that rheumatism may appear anywhere, but as there is a special distribution of this tissue in connection with joints, voluntary muscles and nerves, it is not surprising to find that it is in these structures that rheumatism most often appears. It is evident that the so-called chronic rheumatism, myalgia, lumbago, neuralgia, sciatica are all one and the same disease. The only real difference between them being the anatomical situation of the fibrous tissue which is attacked. These conditions are determined and influenced by many others. The cause is connected with the digestive system, and is certainly produced by the absorption of toxins. These toxins are the result of defective metabolism and their inadequate elimination. Of determining causes, damp, cold and atmospheric changes are the most potent. These atmospheric influences are particularly liable to affect joints or muscles whicn have been the seat of an injury or overwork.

Thus, for instance, the rheumatics will always select the fibrous tissue surrounding a joint which has been sprained.

To eradicate these symptoms, the gastro-intestinal tract and the whole system should be thoroughly subjected to the previously described action of radio-active water, supplemented by hot radio-active baths three times per week. The local pains should be treated with radio-active liniment. These methods are extremely simple, safe and certain and quite free from the use of drugs, for to add further drugs to a system already heavily charged with salts will only increase the fatigue in return for a temporary relief.

Following the large number of permanent cures recorded at the famous radium spas and the subsequent claims by practitioners in this country in their treatment of these conditions by clinically prepared emanation, Prof. F. Gudzent published in the British Journal of Actinotherapy, a complete paper to the profession giving details, carried out under his personal supervision, of tests on the emanation methods of treating various types and conditions of rheumatism. It should be noted that these tests were carried out in hospital on patients who were so badly affected that hospital treatment had been sought. After giving details of cases and the method employed, Prof. Gudzent summed up as follows:— "I obtained the following results in treating 262 patients:—

Considerably improved ...	26%
Improved	31%
Practically cured	5%
Slightly improved	21%
No improvement	17%

(Official results never claim complete cures owing to the possibility of a re-occurrence at a later date).

Summing up experiments conducted at the same time:— "Experiments show that mild radium treatment stimulates biological processes. For example, the activity of the hematopoietic organs is increased, basic metabolism is augmented, uric-acid secretions, owing to mobilisation of the purin deposits, is stimulated and blood pressure reduced. These factors in combination with others . . . may explain the cures in chronic reheumatism".

ARTHRITIS

Under the name of arthritis deformans are included cases of arthritis displaying tendency to chronicity, with permanent changes in the joints or tissue; those forms of arthritis which are clearly established as osteo-arthritis and variations such as gouty rheumatoid and gummatous.

The classification of cases of chronic arthritis is made purely in clinical groups, viz.:— Polyarticular arthritis deformans, chronic and sub-acute and senile or localised arthritis deformans. The view as to the origin of the disease which is steadily gaining ground and is held by some authorities to explain all cases, is that of toxic infection, the organism and the source differing, individual reaction and resistance determining the consequent changes. Amongst the influencing factors may be considered the following. A majority of cases occur in women. The twenty years between thirty and fifty cover the largest number of cases. Heredity is not proved but the belief is widespread in the profession. Mental influences, such as strain, worry and such immediate factors as shock, reduces the powers of resistance. Damp, cold, low elevation are predisposing causes.

Amongst the commonest sources of infection are pyorrhoea and carious teeth, tonsillitis, pyelitis and cystitis, gastro-intestinal conditions, constipation and suppurating wounds. According to the seat of the lesions, three main varieties may be distinguished. (1) With lesions in synovial membranes, (2) With atrophy of cartilage and bone. (3) With hypertrophy of bone.

The synovial membrane is thickened with formation of fringes. The ligament may be thickened or elongated; bursae around the joints may be enlarged, tendons partially destroyed.

The cartilage may in some cases be replaced by fibrous tissue. In the spine, the intervertebral cartilage may be replaced by bone leading to bony ankylosis.

The bones may show little or no change. In the hypertrophic variety there is a formation of new bone resulting in bony outgrowths which may invade the ligaments and tissue and these outgrowths may lock the joints.

The deformities of arthritis are not particular to it, but may be seen in other chronic joint affections. Irregular pyrexia and rapid pulse, secondary anaemia and trophic and vaso-motor changes, such as localised sweating and glossy skin. Pigmentation, general or in patches.

It was Lothenthal who first introduced the emanation treatment to arthritis. Subsequently V. His and Gudzent in Germany and Teissier and Rabattu in France expanded the treatment. Most workers report a fall in the blood urea, and the disappearance of tophi, whilst the elevation of pain is the outstanding feature of the treatment. Another consistent result is the reaction or crisis which may occur about the end of the second week of the treatment. This is a good omen and foretells a successful result. As a rule it consists merely of a temporary exacerbation of the symptoms accompanied by a sense of malaise, and not infrequently a rise in temperature. For the two or three days the reaction is apparent, the drinking water and inhalations should be reduced but the liniment treatment should be continued on account of the soothing effect. This crisis is caused by the emanation converting the insoluble uric acid deposits to the soluble which are then thrown into the blood stream for elimination via the usual channels. The blood stream in these conditions is already loaded with salts (hence the objection of the profession to treatment by internal dosage of chemicals) and this additional quantity from the dissolving deposits in and around the joints causes this increased symptoms. The reaction is followed by a diminution of pain and stiffness and the slow but gradual improvement. Bone deformities, of course, remain but the softening of adhesions, etc. greatly improves movement formally restricted. Prof. Dawson Turner of Edinburgh says "The pain, redness and swelling usually disappear with great rapidity but affections of the lower limb appear to be more rebellious than those of the upper limb".

The English writer, Dr. Berkley Way, wrote in 1931 on post-operative treatment:— "After removal of the septic foci the patient hopes for rapid improvements, which is sometimes obtained if he is rich enough to have recourse to spa treatment. Usually however, it is months before he feels better after his mutilation. During the last year I have treated at home a series of cases by a method parallel to that obtained in certain Continental spas. An emanator, containing a charge of radium, enabling both baths and drinking water of measured radio-active strength to be taken, whilst pads, worn constantly, allow local application of weak radium emanation to reach the skin. In my series no case ever benefitted with only three weeks treatment, but after four or five weeks, a majority, even the most sceptical, acknowledged improvement as regards pain and a definite feeling of well being".

APPARATUS

Radigam apparatus and the methods employed in administration are the most up-to-date in the world to-day. Very considerable advances and improvements in apparatus and treatment have been made during the past few years and these have been incorporated. In addition to the emanators the following standard materials are now available.

SKIN-FOOD AND OINTMENTS

The thoughtful woman is well aware of how the condition known as "cosmetic" skin develops — how it must necessarily develop with the continued application of preparations unnatural or unsuitable to the skin, however beautifying the superficial and temporary results. It is elementary that the pores cannot breathe freely when they are clogged, that the slowing down of those functions which are naturally active in a healthy skin must impair the surface texture, for nature has her own inexorable way of rebelling against unhealthy practices.

Radio-active skin food promotes the growth and multiplication of the cells which lie beneath the surface. The glands are fed by the increased oxygen supplied to the blood by the action of the activity in the cream so that exhausted skin scales continue to be replaced by the new vitalised tissue. Beauty may indeed be only skin deep, but it is the depth of the beauty that matters and no complexion can be sustained in smooth surface texture unless the deep-down health of the tissue is taken care of. Cosmetics with only a surface action cannot give the same result for the outer skin relies upon the underlying structure for its firmness. When through the intrusion of foreign matter such as dust or harmful cosmetics, the tiny facial glands cease to function, the tissues beneath soften and shrink. The skin, losing its support, collapses, developing lines and wrinkles which no surface cosmetic can eradicate.

There are two kinds of activated ointment in general use. These are known as Ointment Grade 1 or 2 and are used for treating the more severe conditions of the skin. Either of them may be used for general purposes, but No. 1 is prepared specially for conditions where there is much discharge as with ulcers, boils, carbuncles and varicose ulcers. No. 2 is a more general type, and has proved useful in the treatment of such conditions as eczema, impetigo, puritis, psoriasis, acne, ringworm, etc.

The ointments can be constantly applied without any detrimental action whatsoever, no matter how long it is in use. The treatment by these ointments relies on two main features. A selective action which is due to the fact that diseased cells are more radio-sensitive than healthy cells, making it possible to eradicate the disease without damage to the surrounding healthy tissue, and by its stimulating action which assists in the rapid replacement of healthy tissue. Contrary to the process of most other treatments by antiseptic ointments, which acts only on the surface, the lesion treated by active ointment heals up from the base, thereby lessening the risk of healthy tissue forming over diseased with the result of an abscess.

LINIMENT

Radio-activity is a great alleviator of pain, and this action is well demonstrated when the activated liniment is applied to a painful area. The activity is capable of passing through dense structures and carrying their healing and soothing properties deep into the tissue. This advantage gives the radio-active liniment the power to reach the seat of troubles where other liniments have no affect.

The penetrating and gravitating of the liniment carrying with it the active deposit of emanation, provides the effect of raising the total vitality of the underlying tissue, and increasing the blood supply to the area. The action of the liniment continues for some time after the application since the induced activity imparted by the deposits of the emanation remains active for some hours, thus the total effect of treatment with radium liniment can be compared to an effective massage of the cells.

INHALOR

For the treatment of diseases of the respiratory organs there is a small dry type inhalor which the patient can use at home after receiving simple instructions. Inhalations of emanation is the most efficient way of introducing emanation to the system for rapid absorption by the blood stream. When emanation is taken in solution it reaches the portal circulation through the digestive tract. Since the emanation is inhaled and eliminated by the respiratory system the presence of activity is continuous within this system.

RADIUM PADS

The most modern radio-active pad relies on no outside influence. It is completely self-contained, since by virtue of the radium content whose energy decays at the rate of one half every 1700 years, the radiations and emanation are internally spontaneous and for all practical purposes, everlasting. These modern pads contain only the purest refined radium with the result that they are light and occupy very little space. They can be worn in any position and under the flimsiest garment without being seen, and because they are self-contained, the patient may wear them throughout the day and night without any interference with normal daily activities. In addition to the standard Radigam pad, it is possible, upon being supplied with relevant data, to make pads to suit any particular part of the body at any strength to meet the condition.

Prof. Singer in his article in the Lancet, Feb. 1930, said "At first I was disposed to disparage radio-compresses but having three years' experience of them, I became a firm believer in this form of treatment". He used the pads in a great variety of cases and stated that in almost every case he had good results after a short treatment. The speedy results which follow the application of these pads have to be experienced to be believed.

Laboratory Control

The instruments and preparations for use in emano-therapy are standardised to a definite activity before being put into service. Therefore uniform therapeutic dosage is governed by their standardised radio-active equilibrium. The ultimate being the International Radium Standard.

Guarantee

In addition to the above control, we guarantee that the gamma radiation from all our instruments and appliances is due to radium and its derivatives and not to thorium, mesothorium or any of their disintegration products.

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